In [156…

```
import pandas as pd
import matplotlib.pyplot as plt
import seaborn as sns
```

In [157…

```
Cab_Data = pd.read_csv('Cab_Data.csv')
Customer_ID  = pd.read_csv('Customer_ID.csv')
City = pd.read_csv('City.csv')
Transaction_ID = pd.read_csv('Transaction_ID.csv')
```

In [158…

```
df1 = Cab_Data.merge(Transaction_ID,  on= 'Transaction ID')
df2 = df1.merge(Customer_ID, on= 'Customer ID' )
data_origin = pd.merge(df2, City, on='City')
```

CLEANING

In [159…

```
data_origin.rename(columns={'Date of Travel': 'Travel_Date',
                   'KM Travelled': 'KM_Travelled',
                   'Price Charged': 'Price_Charged',
                   'Income (USD/Month)': 'Monthly_Income'}, inplace=True)
```

In [160…

```
data_origin['Travel_Date'] = pd.to_datetime(
    data_origin['Travel_Date'], unit='D', origin='1899-12-30')
```

In [161…

```
data_origin['Date'] = data_origin['Travel_Date'].dt.date
data_origin['Month'] = data_origin['Travel_Date'].dt.month
data_origin['Day'] = data_origin['Travel_Date'].dt.day_name()
```

In [162…

```
data_origin['Cust_Loyalty'] = data_origin.groupby(
    'Customer ID')['Transaction ID'].transform('count')

data_origin['Distance_Category'] = pd.cut(data_origin['KM_Travelled'],
                                          bins=[0, 5, 15, float('inf')],
                                          labels=['Short', 'Medium', 'Long'])



data_origin['Age_Groups'] = pd.cut(data_origin['Age'], bins=[
    -float('inf'), 18, 35, 60 ,float('inf')],
                                labels=['<18', '18-34', '35-59' ,'60+'])
```

In [163…

```
data_origin['Population'] = data_origin['Population'].str.replace(
    ',', '').astype(float)
data_origin['Users'] = data_origin['Users'].str.replace(
    ',', '').astype(float)
```

In [164…

```
df = data_origin.copy()
```

In [165…

```
df.drop(['Unnamed: 0', 'Travel_Date'], axis=1, inplace=True)
```

In [166…

```
df.duplicated().sum()
```

Out[166]:

```
0
```

In [143…

```
df.isna().sum()
```

Out[143]:

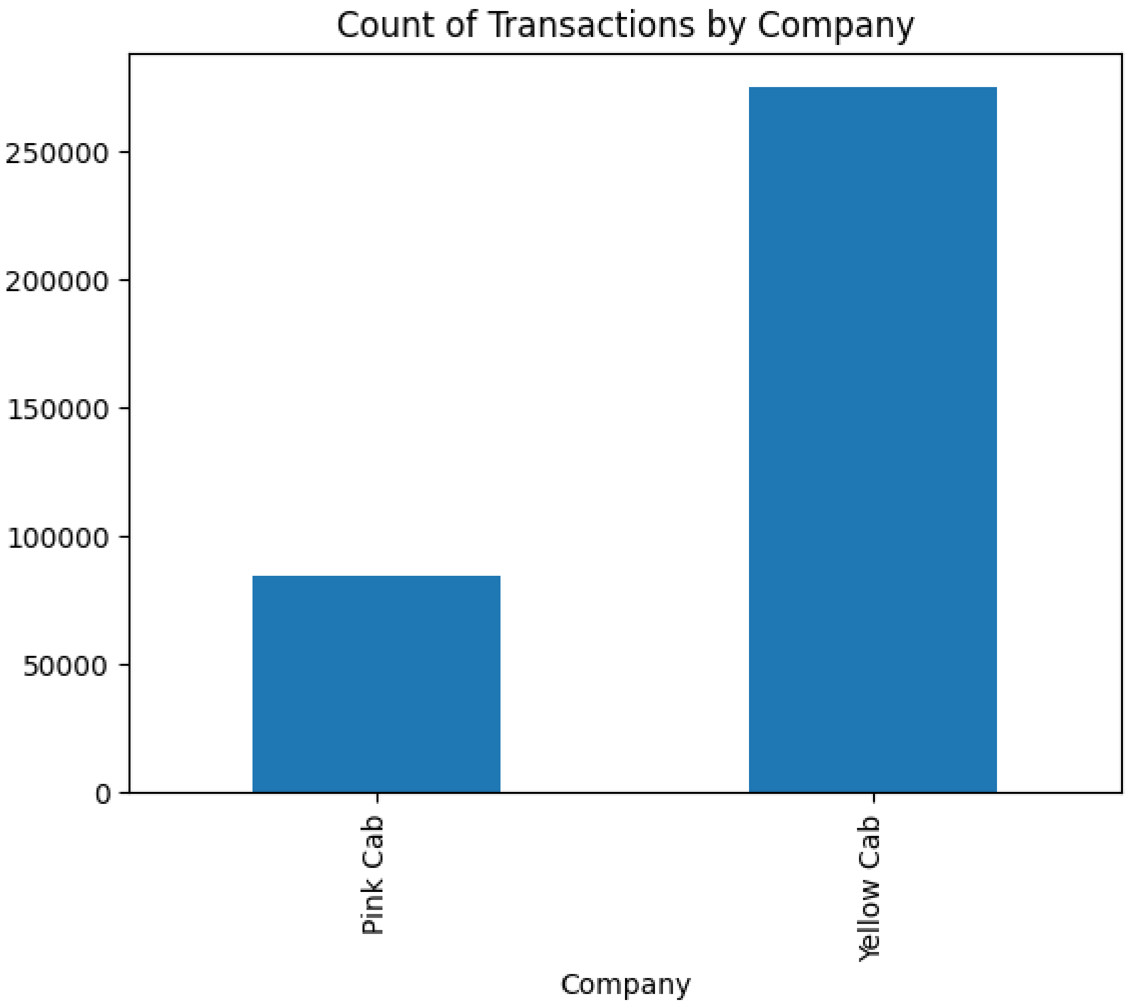
```
Transaction ID       0
Company              0
City                 0
KM_Travelled         0
Price_Charged        0
Cost of Trip         0
Customer ID          0
Payment_Mode         0
Gender               0
Age                  0
Monthly_Income       0
Population           0
Users                0
Date                 0
Month                0
Day                  0
Cust_Loyalty         0
Distance_Category    0
Age_Groups           0
dtype: int64
```

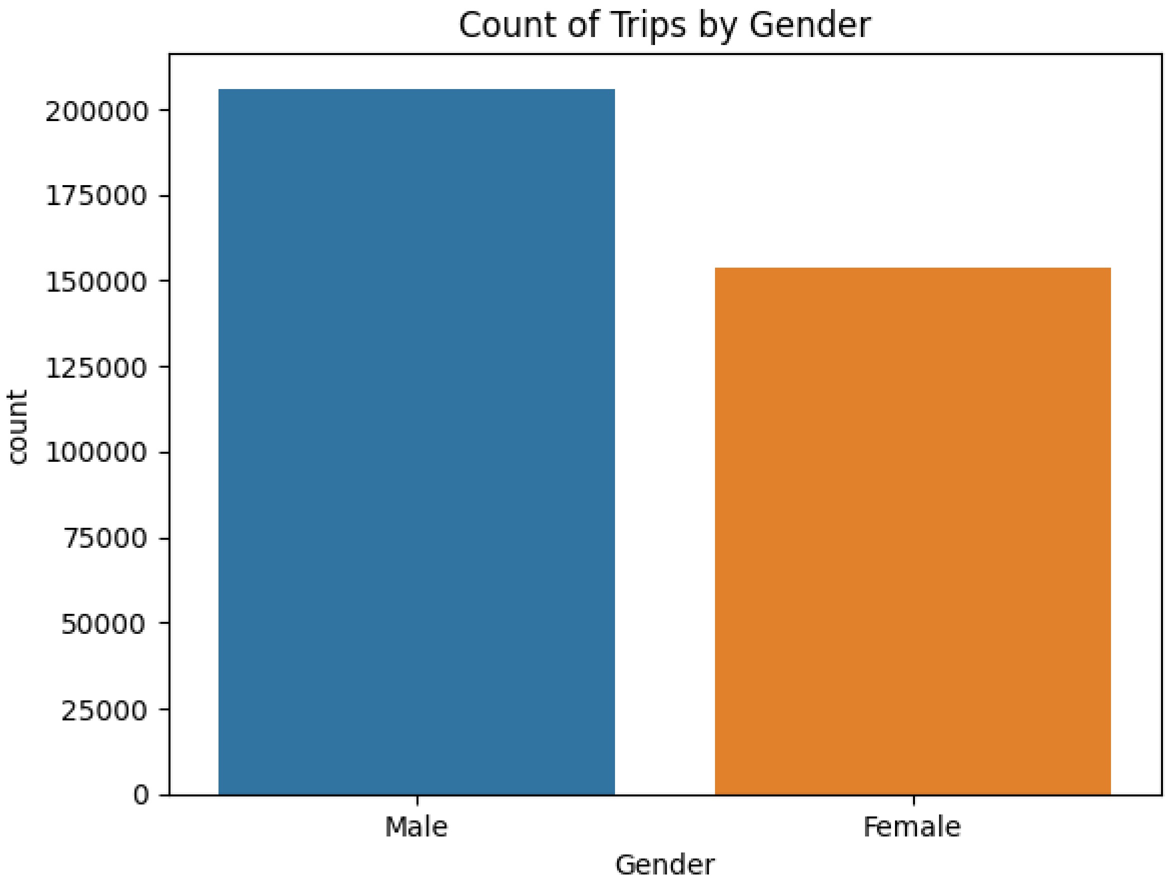
Data exploration

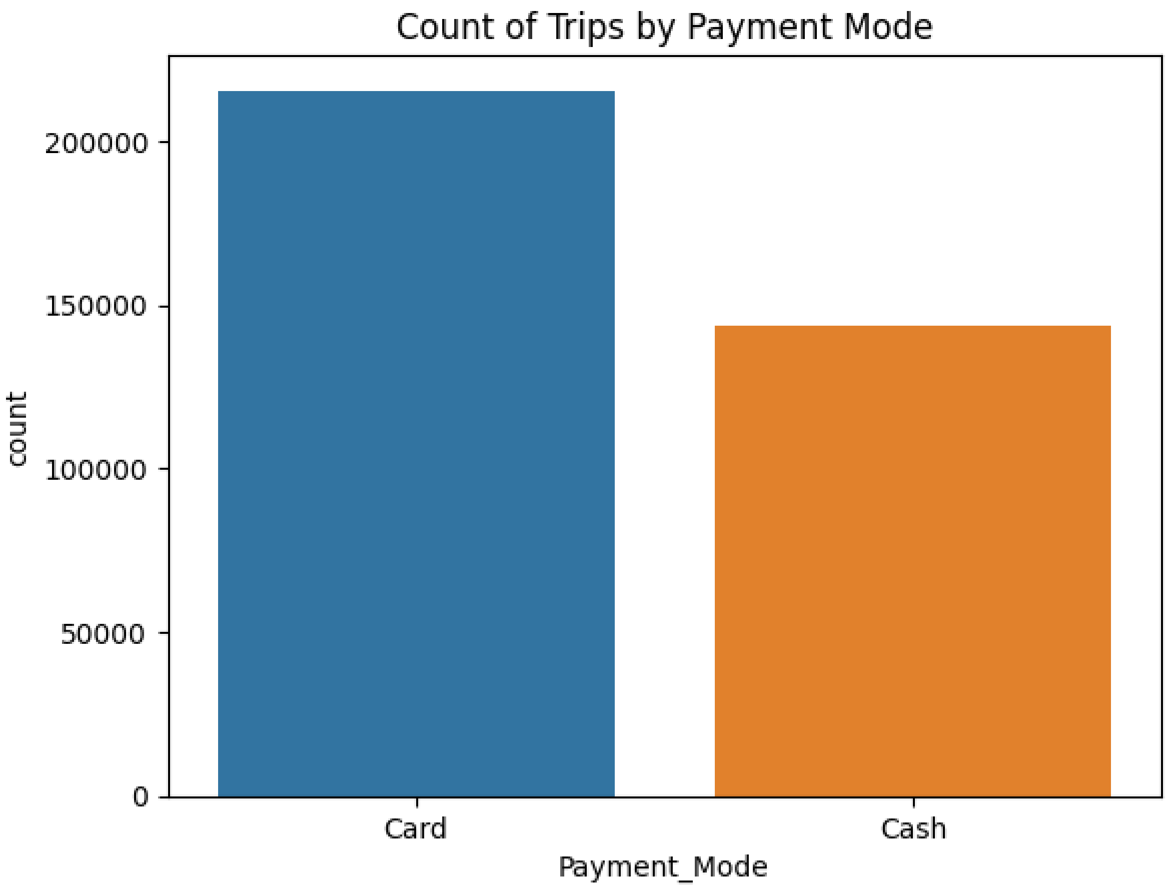
Transaction Analysis

In [167…

```
df.groupby('Company')['Transaction ID'].count().plot(kind='bar')
plt.title('Count of Transactions by Company')
plt.show()

sns.countplot(x='Gender', data=df)
plt.title('Count of Trips by Gender')
plt.show()



sns.countplot(x='Payment_Mode', data=df)
plt.title('Count of Trips by Payment Mode')
plt.show()
```

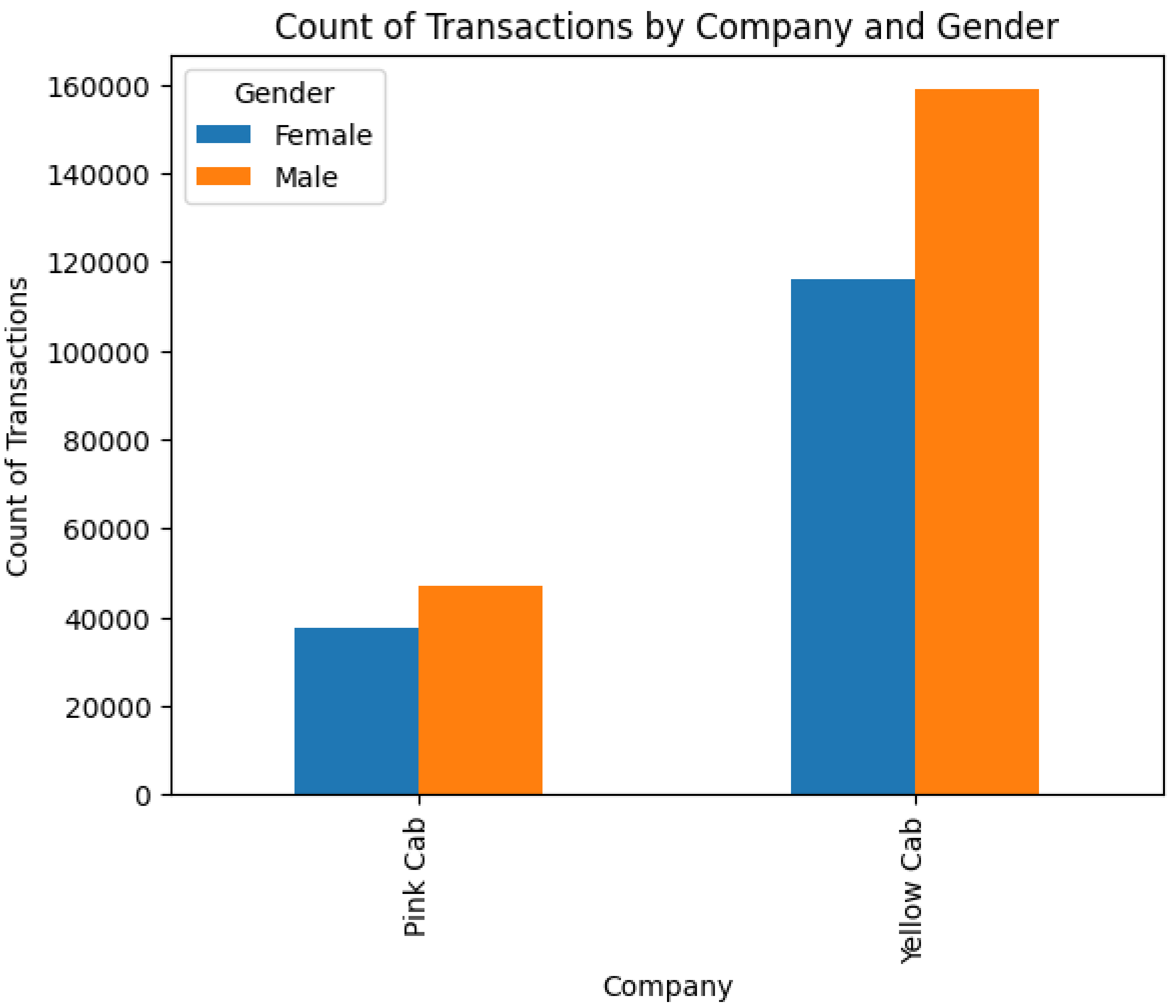

Count of Transactions by Company
250000
200000
150000
100000
50000
0
Pink Cab
Yellow Cab
Company


Count of Trips by Gender
count
200000
175000
150000
125000
100000
75000
50000
25000
0
Male
Female
Gender



In [168…

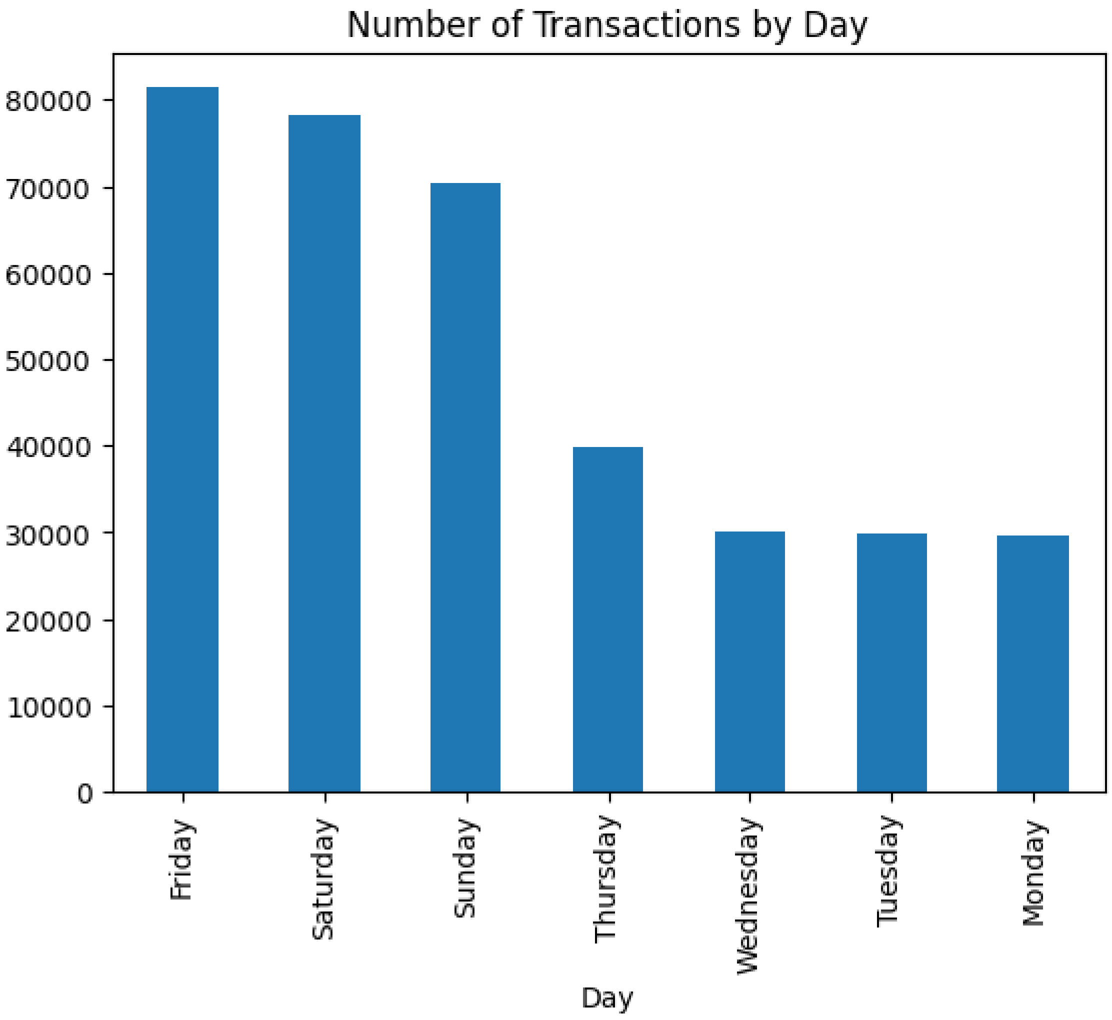
```
df.groupby(['Company', 'Gender'])['Transaction ID'].count().unstack().plot(kind='bar')
plt.xlabel('Company')
plt.ylabel('Count of Transactions')
plt.title('Count of Transactions by Company and Gender')
plt.show()
```

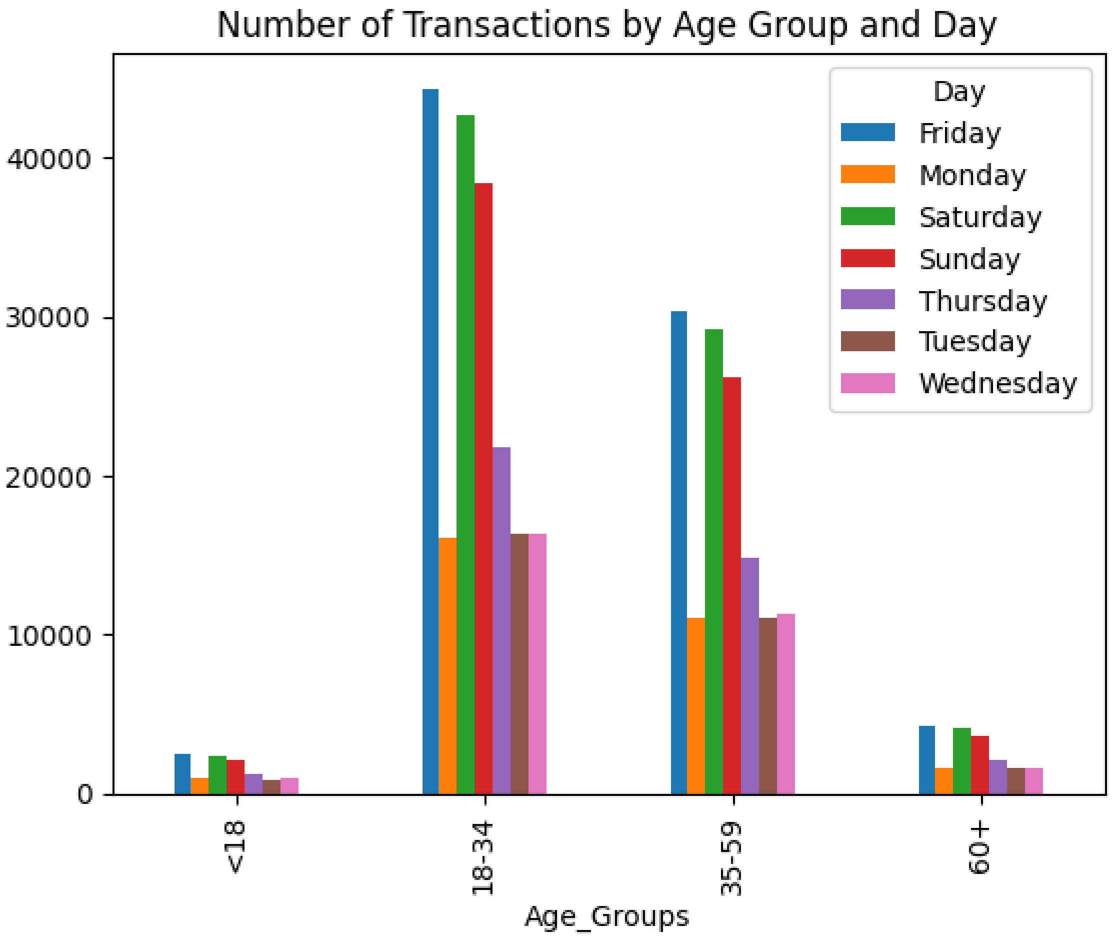


Temporal Analysis

In [146…

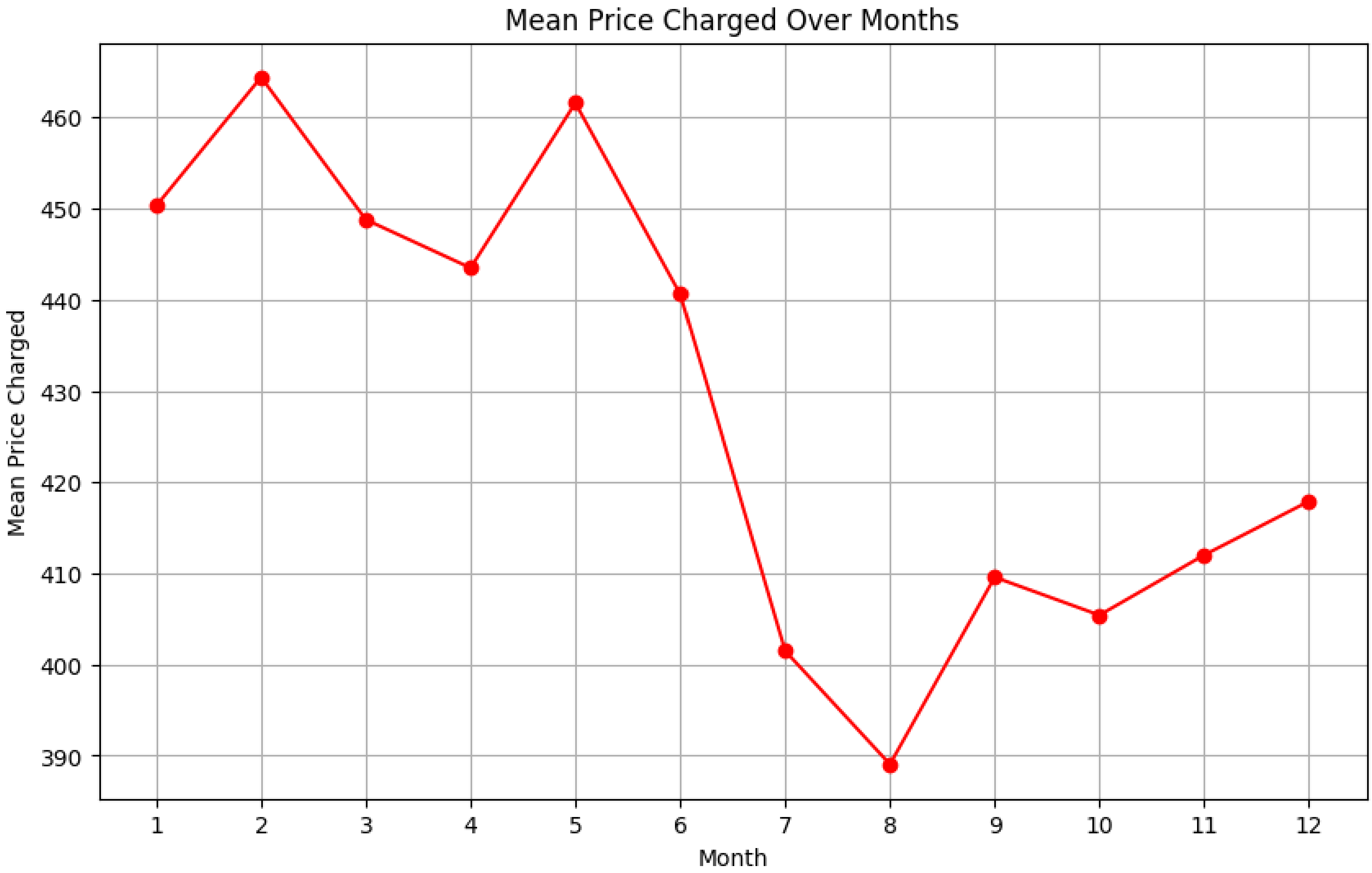
```
df.groupby('Day').size().sort_values(ascending = False).plot(kind = 'bar')
plt.title('Number of Transactions by Day')
plt.show()

df.groupby(['Age_Groups', 'Day'])['Transaction ID'].size().unstack().plot(kind='bar')
plt.title('Number of Transactions by Age Group and Day')
plt.show()
```


Number of Transactions by Day
80000
70000
60000
50000
40000
30000
20000
10000
0
Friday
Saturday
Sunday
Thursday
Wednesday
Tuesday
Monday
Day



In [169…

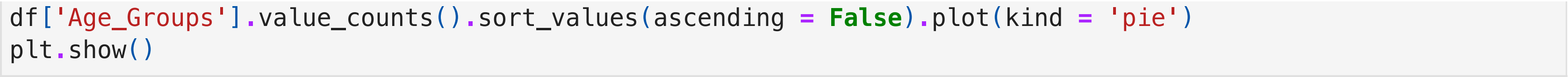
```
monthly_mean_price = df.groupby('Month')['Price_Charged'].mean()

plt.figure(figsize=(10, 6))
monthly_mean_price.plot(kind='line', marker='o', color='red')
plt.title('Mean Price Charged Over Months')
plt.xlabel('Month')
plt.ylabel('Mean Price Charged')
plt.xticks(range(1, 13))
plt.grid(True)
plt.show()
```



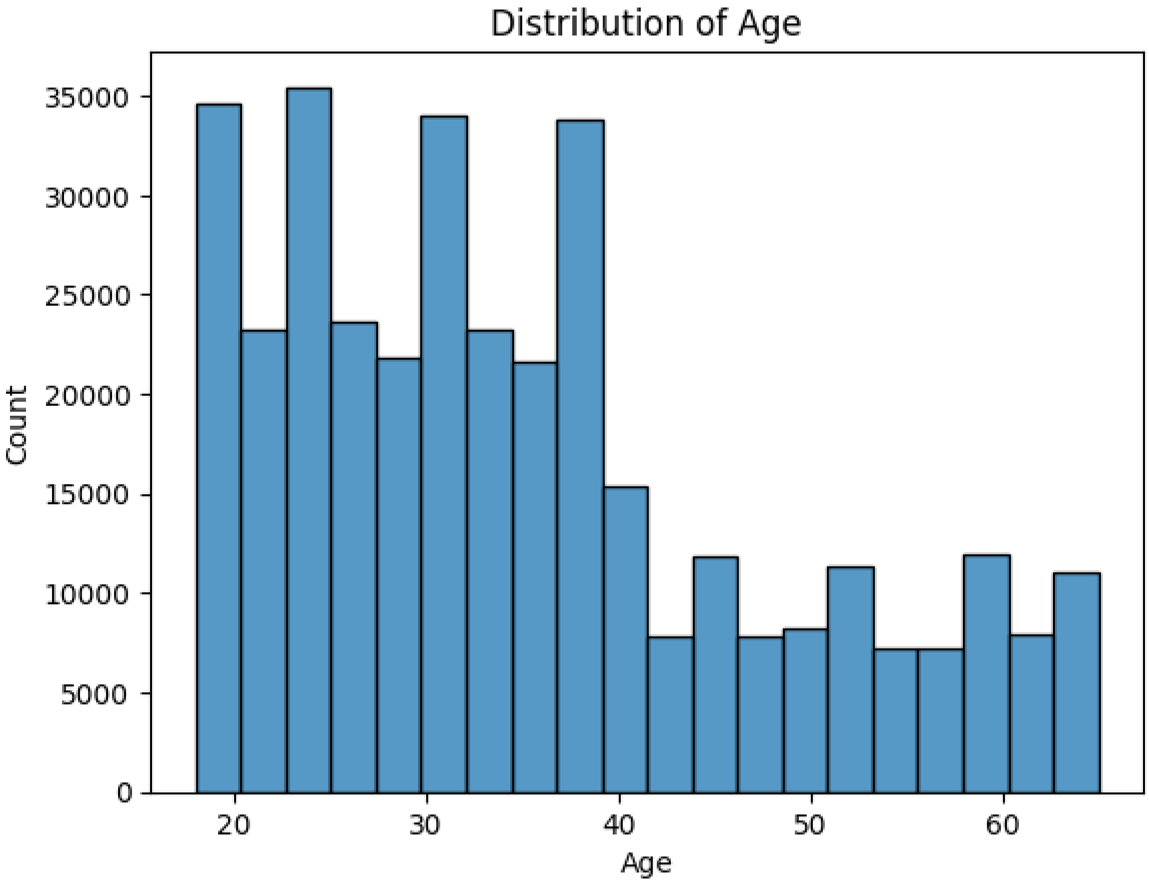
Distribution Analysis

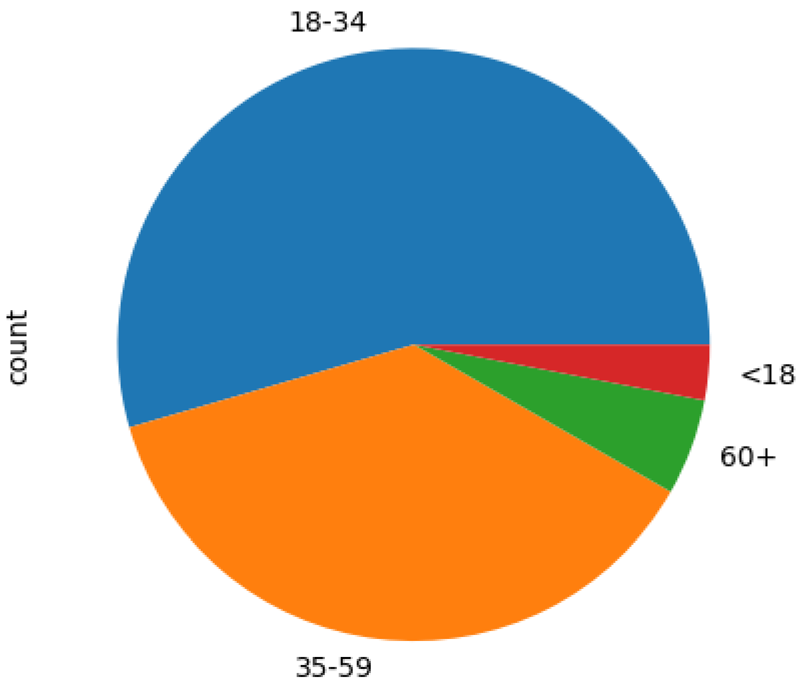
In [170…

```
sns.histplot(x='Age', data=df, bins=20)
plt.title('Distribution of Age')
plt.show()
```



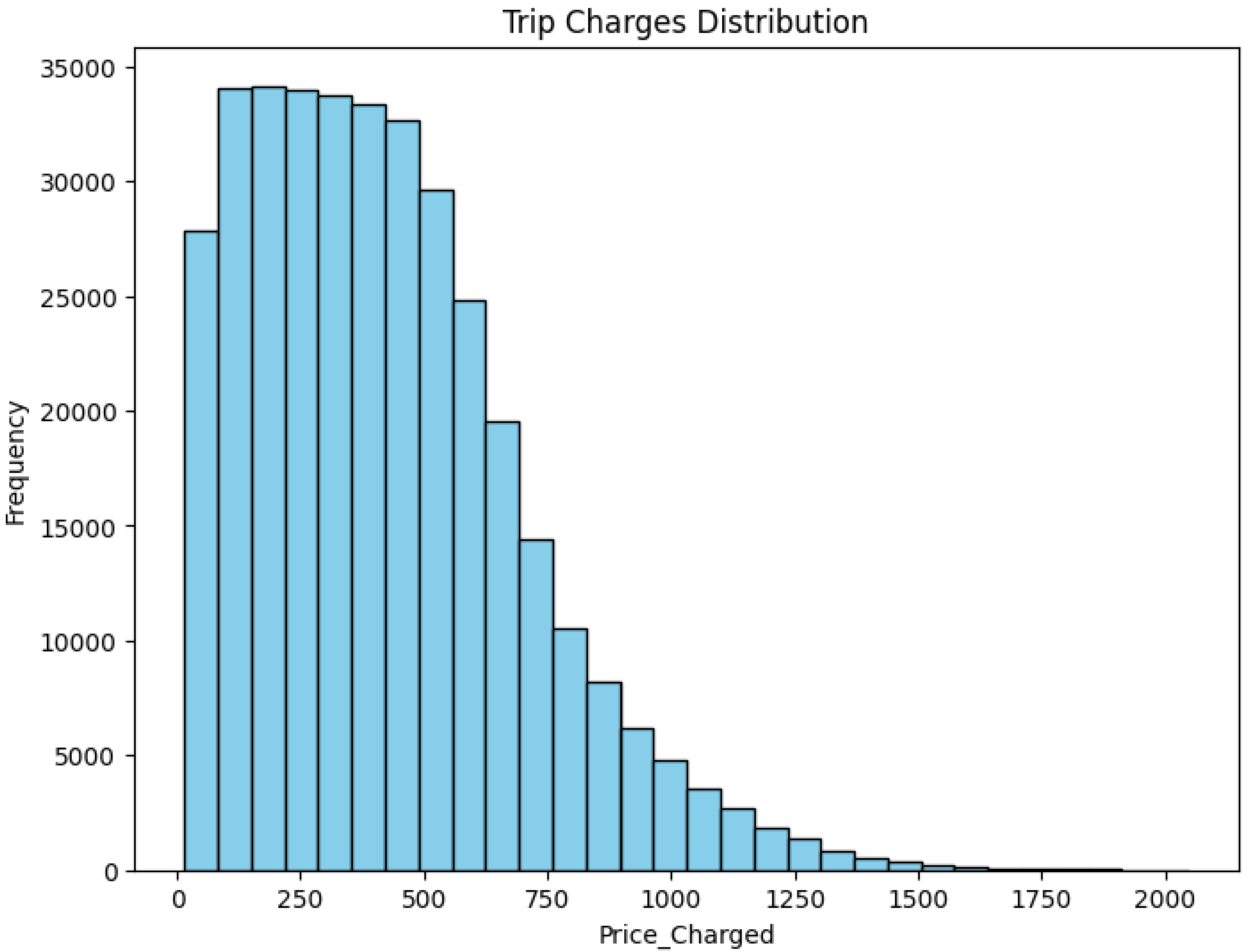
```
df['Age_Groups'].value_counts().sort_values(ascending = False).plot(kind = 'pie')
plt.show()
```





In [171…

```
plt.figure(figsize=(8, 6))
plt.hist(df['Price_Charged'], bins=30, color='skyblue', edgecolor='black')
plt.title('Trip Charges Distribution')
plt.xlabel('Price_Charged')
plt.ylabel('Frequency')
plt.show()
```

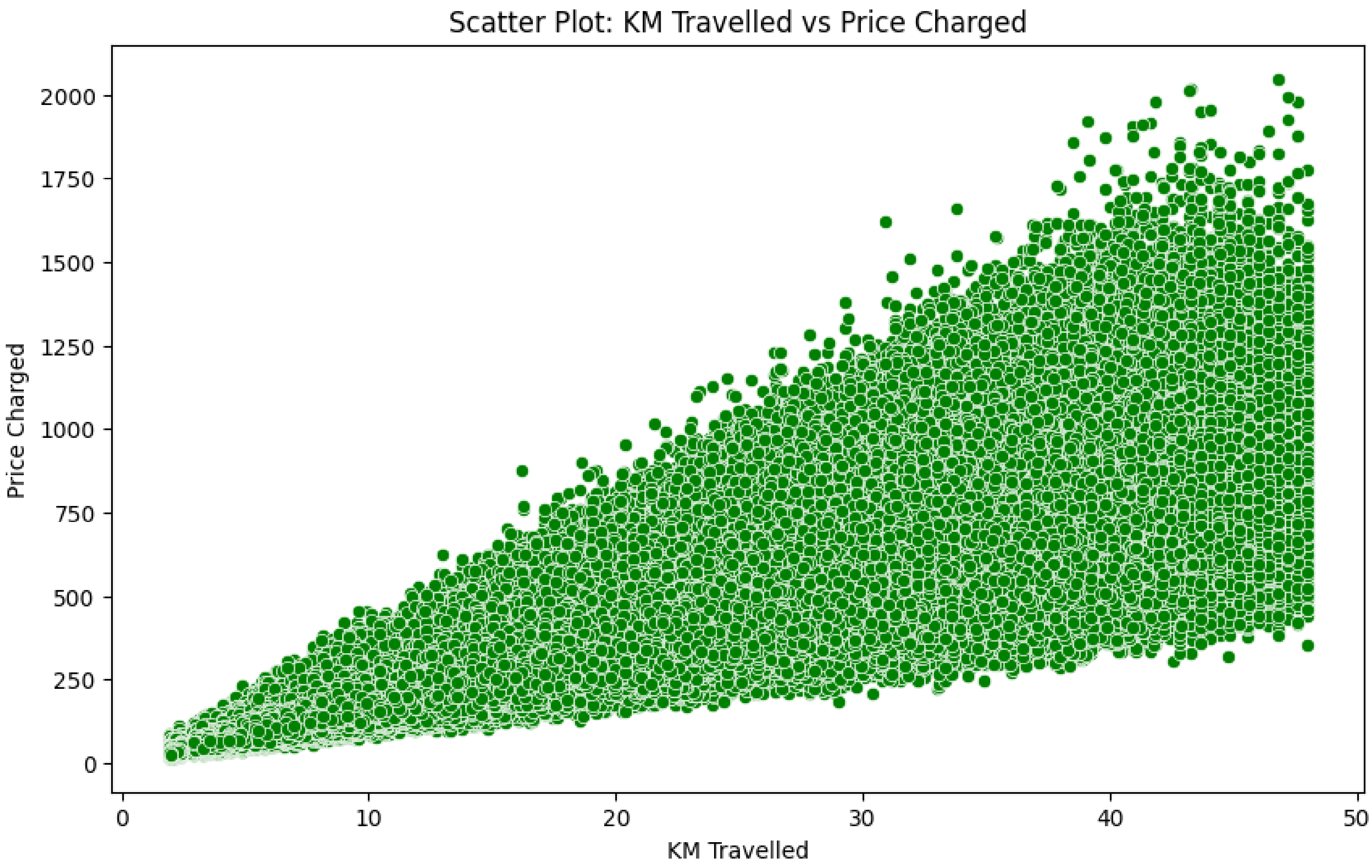


Relationship Analysis

In [172…

```
plt.figure(figsize=(10, 6))
sns.scatterplot(x='KM_Travelled', y='Price_Charged', data=df, color='green')
plt.title('Scatter Plot: KM Travelled vs Price Charged')
plt.xlabel('KM Travelled')
```

```python
plt.ylabel('Price Charged')
plt.show()
```



In [151…

```python
df.groupby('City').size().sort_values(ascending = False)
```

```
Out[151]: City
          NEW YORK NY       99885
          CHICAGO IL        56625
          LOS ANGELES CA    48033
          WASHINGTON DC     43737
          BOSTON MA         29692
          SAN DIEGO CA      20488
          SILICON VALLEY     8519
          SEATTLE WA         7997
          ATLANTA GA         7557
          DALLAS TX          7017
          MIAMI FL           6454
          AUSTIN TX          4896
          ORANGE COUNTY      3982
          DENVER CO          3825
          NASHVILLE TN       3010
          SACRAMENTO CA      2367
          PHOENIX AZ         2064
          TUCSON AZ          1931
          PITTSBURGH PA      1313
          dtype: int64
```

Finds

Most popular company: Yellow Cab.

More trips by gender: Male.

Most popular payment mode: Card.

Highest number of transactions by day: Friday.

Highest average monthly price charged: February.

Lowest average monthly price charged: Augusto

Machine Learning

```
In [173…  import pandas as pd
          from sklearn.linear_model import LinearRegression
          from sklearn.metrics import mean_squared_error
```

```
In [174…  X = df[['KM_Travelled']]
          y = df['Cost of Trip']

          model = LinearRegression()
          model.fit(X, y)
          predic = model.predict(X)
          predic
```

```
Out[174]:  array([386.14636715, 332.12792637, 539.5790276 , ..., 297.51047488,
                  350.00726945, 434.20502691])
```

```
In [175…  # Evaluating the model
          mse = mean_squared_error(y, predic)
          print("Mean Squared Error:", mse)
```

```
         Mean Squared Error: 897.9742429708771
```

ML App Link

https://capstone-1x3l.onrender.com